



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/902,283      | 07/10/2001  | Chen-An Chen         | 3130/D1/TCG/PMD/LE  | 8681             |

32588 7590 05/15/2003

APPLIED MATERIALS, INC.  
2881 SCOTT BLVD. M/S 2061  
SANTA CLARA, CA 95050

EXAMINER

MACARTHUR, SYLVIA

ART UNIT PAPER NUMBER

1763

DATE MAILED: 05/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/902,283

Applicant(s)

CHEN ET AL.

Examiner

Sylvia R MacArthur

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

### Status

- 1) ☐ Responsive to communication(s) filed on 23 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☐ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some \* c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
  2. ☐ received in Application No. (Series Code / Serial Number) \_\_\_\_\_.
  3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

### Attachment(s)

- 15) ☐ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 18) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. *Claims 1-3, 5, 6, and 9-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Takamatsu et al (USP 6,155,540).*

Takamatsu teaches a method for vaporizing and supplying a material using an injection valve having: a vaporizer 9 (inherently comprising a vaporization region) wherein a liquid material for CVD is introduced by a processing liquid inlet 5. Figure 1 also illustrates an ultrasonic atomizer 15 comprising an ultrasonic vibrator (comprising a sonic wave generator) 14. Two inlets for a carrier gas 17 are disposed at upper parts of the vaporizer. Each inlet for a carrier gas 17 is disposed in the direction parallel with a plane perpendicular to the outlet of a vaporized gas (this outlet also disperses a mixture of carrier gas and vaporized processing liquid, see col. 6 lines 9-25).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. *Claims 4 and 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takamatsu in view of Micard (USP 4,684,104).*

The teachings of Takamatsu were discussed above.

Regarding claim 4 and 16, Takamatsu fails to teach a piezoelectric effect.

Micard discloses an electrically controlled valve with piezoelectric effect. A stack of piezoelectric ceramics (flexible plates) generally forms a piezoelectric element 14 of the conventional type. The element is clamped between the base plate 12 and the bottom wall 18 of a case 16 by a resilient pre-stressed element.

The motivation to utilize a piezoelectric means as taught by Micard in is that it is arranged for exerting on closure member 30 (control valve) a percussion force for throwing said closure member from the first abutment position to the second abutment position upon application of an electrical voltage to said piezoelectric means and for throwing said closure member from the second abutment position to the first abutment position upon removal of said electrical voltage. Col.1 lines 23-46 disclose a controlled valve that is used as an actuator (opening/closing the valve to adjust flow).

Note that the piezoelectric effect generates waves to output a voltage signal.

Regarding claim 18, the limitation "the wave generator outputting a voltage signal of zero volts to open the processing liquid inlet" is an intended use in that the wave generator is capable outputting a voltage signal of zero when the generator is turned off.

Regarding claims 20 and 21, wherein the voltage signal is D.C. It would have been obvious to provide a D.C. voltage signal as it is a suitable means of voltage from a limited number of choices A.C. or D.C.

One of ordinary skill in the art at the time of the claimed invention would have found it obvious to use the piezoelectric effect of Micard to promote flow of the fluids into vaporization regions of Takamatsu.

5. *Claims 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takamatsu in view of Nguyen et al (USP 5,925,189).*

The teachings of Takamatsu were discussed above.

Takamatsu fails to teach trapping residue.

Nguyen discloses a liquid precursor delivery apparatus.

In col. 1 lines 26-28 Nguyen teaches that the injection valve is used for providing a processing gas to a CVD chamber. Fig.1 illustrates a basis injection valve to process chamber 12. A liquid container 14 uses a carrier gas through injection valve 18.

Nguyen recognizes the build-up of residue in an injection valve. Fig.4 illustrates a build-up of residue 82 around orifice 70.

One of ordinary skill in the art at the time of the invention would find it obvious to use the injection valve of Takamatsu in the liquid precursor delivery apparatus of Nguyen to the

Art Unit: 1763

CVD chamber. Takamatsu provides optimal vaporization of a liquid source to the CVD apparatus of Nguyen.

6. *Claims 8 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takamatsu in view of Nguyen, in further view of Ketchum (USP 5,413,671).*

The teachings of Takamatsu and Nguyen were discussed above.

Both fail to teach performing a cleaning process.

Ketchum teaches an apparatus provided for removing deposits, which accumulate within a continuous APCVD. Cleaning is performed in-situ. As wafers 16 enter chamber 12, thin film materials or dopant materials are directed upon wafer 16 via injector 18. Injector 18 receives vaporized material.

The motivation to combine the teachings of Takamatsu and Nguyen with those of Ketchum is to provide a cleaning process within the process chamber is to remove deposits of residue in-situ.

Thus, it would have been obvious to combine the teachings of Takamatsu, Nguyen, and Ketchum to provide a cleaning process within a semiconductor processing system/

#### ***Response to Arguments***

7. Applicant's arguments filed April 23, 2003 have been fully considered but they are not persuasive. Applicant argues that the prior art by Takamatsu fails to teach the provision of an injection valve. Nevertheless the examiner notes that Takamatsu comprises all the components

Art Unit: 1763

discussed in claims 1, 16, and 17 of an injection valve. The area that has been cited in dashed lines is considered an injection valve.


Additionally, in response to applicant's argument that Micard and Takamatsu can not be combined, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).


### ***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R MacArthur whose telephone number is 703-306-5690. The examiner can normally be reached on M-F during the core hours of 8 a.m. and 2 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9630 for regular communications and 703-872-9630 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

  
Sylvia R. MacArthur  
May 14, 2003

  
Gregory L. Mills  
Primary Examiner  
Art Unit 1763